'Net Gains

using the Internet for educational projects

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Nettement mieux

élargir la portée du musée avec des réseaux électroniques

paper prepared for the Museum Computer Network 1996 conference
session: The Museum goes to school

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Oosterdok 2, Amsterdam, NEDERLAND

Ottawa, 1 November 1996

Published in "Spectra", the Museum Computer Network magazine, Winter 1996/97 issue (vol 24, 2), p30-33, Ottawa

Educational projects using the Internet

One of the main issues for museums, and especially for science museums and science centres, is their educational activities and the models they follow to achieve their educational mission.
In this paper I will focus on the educational activities of science centres, and how these are being transformed by electronic communication.

Educational activities in the science centres

By 'educational activities' I am speaking of specifically targeted projects that the science centre develops for the schools, usually about specific subjects, that are carried out by the students themselves.
The first main classification can be made between school activities that take place inside the science centre, and activities that take place outside the science centre, in the classroom or in the community.
If the first, indeed, represents a natural complement, stimulus and extension to the formal education system, the second act directly in or on the formal education system. Electronic communication gives the science centre a new tool to reach the formal education system. Using the Internet or other communication infrastructures, students can communicate, share documents and data, ask advice and collaborate.

Examples of activities inside the science centre are easy to find, and range from guided tours, demonstrations, lab activities, games to be played inside the museum, lectures, and seminars.
One common aspect of all these activities is that they use the museum as a resource - a source of 'tools' - which can be exhibits, labs or staff. These activities tend to use the museum to give a different point of view on topics often considered 'heavy' or difficult in school. However, in most of these activities it is the science centre that sets the agenda. The students' role is almost always a relatively passive one: they are spectators of an event, and, just like at school, the information process is the 'top-down' one that characterises the formal education system. Participation is encouraged, of course, but it is always linked to the specific environment where the activity takes place. The students can help - they can have a temporary role in an experiment - but it is rare that the science centre makes them active players, to have them actually conduct the experience.
Often this is because educational activities that take place in the science centre have the effect of transforming the science centre into a school - an interactive and delightful one at times - but a school nonetheless, top-down, curriculum-driven, another extension of the formal education system. This often has the effect of robbing the science centre or museum experience of one of its greatest strengths - the fact that it is part of the informal education system, bottom-up and user-driven.

Seen as an extension of the formal system, educational activities inside the museum are still at a disadvantage. For the student the museum visit is often a one-time experience, unrelated to the normal activities taking place in the classroom. As a consequence, students feel like 'guests' of a foreign institution, an institution with which they are often unfamiliar and unable to use effectively.

In sum, we could say that through its in situ activities the museum attracts users to its facilities, and provides them with entertaining, witty or provocative informal environment in which they can look at topics that are supposed to be formally addressed in school. This doesn't mean that the science centre presents the same content in a different setting. Instead it gives the formal education system an informal complement to its own activities - a valuable resource to be used wisely.

Activities outside the walls of the museum or science centre can be carried out in different ways. The museum can organise activities in the classrooms, like lectures or demonstrations; it can develop community-oriented events, held in places like theatres or public spaces; it can provide training for teachers and sponsor the production of guides and resources. With its outreach activities the museum can reach a broader public and, most of all, those 'difficult' communities which, for several reasons, cannot come to the museum itself. Organising outreach activities also signals that the museum is not only a physical place, but a set of resources to address the learning needs of its community. Still, it is difficult to give an active role to the students who take part to these activities. Again, as with activities inside the museum, what the museum provides is often a one-time experience, which can be used as a model or an example for further independent activities, but remains in some ways something which is not a permanent, ongoing part of the students' curriculum.

Electronic communication

After these brief (and by no means exhaustive) considerations, let us look at how electronic communication is radically changing the role of the museum insofar as its educational programmes are concerned.

An educational project involving electronic communication has the following characteristics:

1. the only active main players are the students;
2. it doesn't matter where they actually work and how they submit contents to the project;
3. teachers have the role of 'inspirers' and 'guides' to manage the information;
4. the science centre offers its entire 'knowledge network' rather than only its exhibits.

These projects can be seen as competitions or contests between different schools, where the students create teams to reach the goals set by the project. The competition is not 'part of the game', because there is no real winner or ratings system; but since all communication happens in real time, there is an natural incentive to do better than the others. It is important to note that only the students themselves who create the real content for these projects: there are no other sources or partners who contribute. This aspect is fundamental because it gives prime responsibility to the participants, who know that it is their efforts that make the project take shape.

The use of electronic media gives two main advantages. The first is that the new media are fascinating for the students, while at the same time these projects are also a means for them to learn how to use the new communication technologies. The range of possibilities offered by the new media is extensive - they can use images, sounds, videos - not only text. The second is that the new technologies free the students from location and time, as they can organise themselves and their work as they see fit, and can decide when and from where (school, home, other locations) to submit their pieces of work.

In the projects we work on, teachers are always strategic partners for the museum. The main difficulty is to combine innovative learning processes with the more or less traditional school activities. Our approach has been to leave complete freedom to the teachers about how organise the research activities for the students. Every single classroom was free to chose if the best use of the project was as a framework for their own activities, or as an incentive to discover new ways to approach scientific topics. The choice largely depends on the teacher, and on her or his knowledge of electronic media and willingness to use them.

The science museum community is most often the originator of these projects. At present, at least in Europe, there is no other group which promotes educational projects in the way the science museums do. It is interesting to note that when we look at electronic projects, the value of the science museum is not in its collections or educational programs, but rather in its network of resources - people and institutions that can be easily reached. This creates a new role for the science museum as a facilitator of learning, not because in a museum one can find an explanation of scientific facts, but because the museum can now put its visitors in contact with the real science and the people behind it.

The main characteristic of such projects is that students use computers and networks to share information, to make available to a large audience (other participants, visitors of the museum, or the whole Internet community) their work, and to use the entire network as a research tool.

We would like to describe two projects to illustrate some of the points above. These two projects, one developed at Laboratorio dell'Immaginario Scientifico in Trieste, Italy, and the other currently under development at newMetropolis in Amsterdam, are examples of how the museum is changing its role towards the school community.

First case: nation-wide collaborative projects

In 1994, the Laboratorio dell'Immaginario Scientifico, a science centre in Trieste with a small exhibition area but with an important network of collaborations with research institutes and educational bodies, launched a series of projects conducted over a Bulletin Board System, that is, a work group communication software. For the past two years, students have worked on the themes of garbage recycling, air pollution, noise, drug abuse and energy.

The main theme was set by the museum, whereas the range of didactic activities was left to the individual participants. Students organised themselves to do surveys, research, interviews, analysis, multimedia presentations. All these activities were scaled (as far as depth, scientific relevance, etc.) according to the students' capabilities and school level, and the electronic communication network made possible for the students to concentrate on specific aspects of the subject, without losing sight of the general topic.

The first projects involved a survey, which was first discussed and 'approved' by the participants, who sent written comments until a final version was finalised; afterwards, the results were made available in order to give a broad view of the problem from the different cities were the students lived. We then asked them to conduct parallel activities with all participants, such as interviews or research in conjunction with newspapers and local government bodies, in order to see how the problem was

approached in the different communities. Sharing these data was both engaging for the students, and challenging because they saw what their fellow students were doing.

In the last project, with the theme of drug abuse, such a model couldn't be used, both because the number of participants increased, and because the subject was too broad to limit it to selected activities.
In this case we provided a framework, a classification of the theme 'drugs' into several different sub-topics (from biology to culture, from arts to chemistry) giving the students the task of filling in these empty 'folders' with the results of their research. This gave the teachers another task - to manage and check with the other teachers the subjects and the activities to be done. What is important to notice is that in these activities the students and the teachers are the only players - they are not merely spectators of a programme set up by the museum. In this model, rather than providing contents, or even the activities, the museum becomes a sort of agency for the school - the hub of a network of contacts between schools themselves and between schools and 'knowledge providers' - the many different sources of information the students can access as part of their research.

Why is the museum necessary in this model at all, you may ask?

First of all, it is the 'glue' for all the participants in the project, with an important technical as well as managerial role to play. But the most important role is a creative one, which has no equivalent in the other kinds of activities normally undertaken by the science museum or science centre. This kind of project is very dynamic, and their main strength - the fact that teachers can organise their activities according to their own schedule and teaching methods - also brings with it unpredictability as far as the direction of the project is concerned - an unpredictability that the science museum needs to guide if the projects is not to collapse.

For example, during the 'DrugNet' project, one group of students started to explore the connections between drug abuse and the arts, shifting the main research from a 'scientific' one to a more 'humanistic' or 'artistic' one. In this case the museum must be able to quickly adapt and collaborate with the schools to help them to 'expand' the network of resources involved in the project.
With an easy metaphor, we can imagine these projects like a spider making its web: according to the starting point, and the environment around the schools, the directions, and the way in which the web is made, change. Since the main emphasis of these projects, and their true educational value, is primarily found in the process rather than in the content, the relationship between the museum and its users changes - the activity is more a partnership than merely an isolated visitor experience.

Second case: international co-operation

The activity which is currently being developed at newMetropolis is a project with many faces, which uses the museum not only as one of the resources to collect data for the students, but also as a social venue where visitors can be informed, through the work of the students, about some social and environmental issues around the world.

Briefly described, the newMetropolis project invites different classrooms from around the world to approach the same issues (such as global issues like environment or energy, or local issues like health and labour) according to their local situation, augmented with examples and suggestions from a global perspective, thanks to their fellow students' work. Students can share their research, compare the results, and propose model solutions, which are immediately available in different museums around the world, for the public to comment upon, thus giving further advice to the students and impetus to the project. In this case the museum not only organises the project, but it also makes its premises available to the students, who can use it 'virtually' (that is, through the electronic network) to reach the visitors (this time 'real' people) in order to have constant feedback on their activities. Students are thus creators of an exhibit for the public, and thereby exploit the museum as a social place in their community, while at the same time they collaborate with the museum to create a 'network' of resources, and to learn a method of research and organisation of information.
The public, on the other hand, can enjoy an exhibit which is not a view of reality mediated by the museum, but a real learning activity which is part of an ongoing programme of discussion, debate, and change. What we see in this model is a museum which is less and less a depository of objects, but a place built by people - a sort of training area where students and young people have the opportunity to do real research, discuss real issues, and ultimately, to transform the world they live in.

Conclusions

The examples above show two of the many possible ways in which science centres can fulfil their function as informal learning environments. The changes in our society challenge all our institutions to re-assess their role. In the educational field, it is interesting to see how electronic communication has not only brought a new range of activities - collaborative projects that didn't - or couldn't - exist before, but created a new partnership between the science centre and the school community, whereby the science centre becomes the 'knowledge agency' - the source of ideas and contacts - to actively engage students with real issues in science and technology and society.